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ATTACHMENT 8. ECONOMIC ANALYSIS – WATER SUPPLY COSTS AND BENEFITS

Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins

Attachments to this Section

- Project Benefits and Avoided Costs Narrative
- Tables 10/14, 15, 16, and 18 (Table 17 not included; reduced electricity costs associated with pumping not quantifiable at this time).

Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins
Sonoma County Water Agency

Project Benefits Worksheet					
Benefit Type	Benefit Amount	Unit of Measure	Economic Unit	Water Body	303d yes/no
Sediment Reduction	Flood storage and conveyance sufficient to protect the surrounding community from the damages associated with the one in one hundred year flood. See Avoided Costs for Benefit Amount.	See Avoided Costs	See Avoided Costs	Copeland Creek	Yes
Habitat Restoration, Invasive Plant Removal, and Improved Fish Passage	• 6,600 lineal feet of high quality riparian corridor with a diversity of canopy tiers to provide fish, invertebrate and wildlife habitat. • Improved water quality functions: for average and greater magnitude flows, as well as, sediment collection and storage; nutrient uptake and conversion and bacterial reduction • Flood storage and conveyance sufficient to protect the surrounding community from the damages associated with the one in one hundred year flood. • Riparian corridor bird habitat and bird watching for hikers who use the creekside trail. • Riparian corridor and floodplain improvements reduce impaired sediment and nutrient conditions downstream in the Laguna de Santa Rosa	1.25 Stream miles (6,600 linear feet) of riparian habitat; 10 acres of non-native invasive shrubs and trees restored by strategically removing exotics and replanting with 2,700 plants. Assumes value of one acre of restored habitat is $3,880	Water quality control value estimated at $6,700/hectare /year; improved recreation estimated at $3,000/hectare /year (PAY – IUCN, Gland, Switzerland)	Copeland Creek	Yes

Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins
Sonoma County Water Agency

Project Benefits Worksheet					
Benefit Type	Benefit Amount	Unit of Measure	Economic Unit	Water Body	303d yes/no
	• Improved passage and outmigration conditions for Threatened steelhead. $38,800				
Increased Water Supply/ Reliability	$45,000	75 acre-feet/year	$600 /acre-foot (wholesale water rate)	Copeland Creek	Yes
Environmental Benefit of base flow supply to the stream	$5,625	75 acre-feet/year	$75/acre-foot[1]	Copeland Creek	Yes
Flood Control and Increased Storm Water Detention	Present Value of Future Benefits: $13,677,400 Net Present Value: $4,289,059 Benefit Cost Ratio: 1.457 Annual Benefit: $867,753	100 year flood protection for Rohnert Park	Based on FRAM storm water model with property estimates from previous flood observations	Copeland Creek	Yes

1. The literature suggests that agricultural water use has a value of $53 per acre-foot, municipal water use has a value of $112 per acre-foot, and water left instream for environmental purposes, including salmonid habitat, has a value of $75 per acre-foot (Brown 2007)

Avoided Costs of Future Projects Worksheet				
Avoided Cost Type	**Avoided Cost Amount**	**Unit of Measure**	**Economic Unit**	**Avoided Cost Description**
Construction of conveyance capacity upgrades (e.g. culverts, storm drains, etc.)	$1 million	Difference between conveyance upgrades and detention basins	Engineer's estimate	Based on the cost of conveyance upgrades within the Copeland Creek Watershed, detention basins are the most cost effective method of providing 100 year flood protection for Rohnert Park's downstream urban area
Future sediment removal and vegetation management	$20,000/year	Reduction in current budgeted costs; focused sediment reduction at a rate of 2,000 cubic yards per year will reduce cost by approximately $5/cubic yard with much reduced environmental damage	Budget estimate; Reduced cost/cubic yard with focused approach	Decrease in operational costs associated with in-stream sediment removal and vegetation management based on historical costs

Project Benefit Narrative Table						
Benefit Type	Beneficiary	When Benefits will be Received	Estimates of Without-Project Conditions	Estimates of With-Project Conditions	Description of Methods Used to Estimate	Other: Adverse Effects, Uncertainty of the Benefits, Statewide Benefits
Flood Control (Hazard Reduction) and Increased Storm Water Detention	Rohnert Park & Sonoma County Water Agency	2015	Continued flooding of Rohnert Park properties and structures with accompanying risks to life and properties and impact on transportation corridors	Upon construction of detention basins will achieve flood control within 100 year storm limits	Preliminary engineering analysis of project alternatives (to contain 100-yr flows within channel) versus qualitative assessment of existing flooding conditions	
Increased Water Supply/Reliability and Environmental Benefit of base flow supply to the stream	Rohnert Park & Sonoma County Water Agency	2014	Continued reliance on imported water and reduced groundwater recharge potential	Increase aquifer recharge, decrease reliance on imported water, increase base flow to the stream with estimated benefits of $5,625 to $45,000 per year.	Cost/acre foot of water	Requires geotechnical and design studies to determine recharge capacity of soils
Sediment Reduction	Rohnert Park & Sonoma County Water Agency	2011-2014	Continued poor habitat conditions for native warm water and coldwater fisheries. Salmonid passage difficult at low and high flows. Detriment to habitat and fish passage. Continued non-native energy inputs (leaf drop, runoff, root-zone interactions) from stream side vegetation. Water quality improvements not realized that result from native plantings and strategic sediment removal. Increased flood	Decrease operational costs associated with continued in-stream sediment removal. Reduce downstream sediment in Laguna de Santa Rosa and lower Russian River and siltation impacts on waterways interconnected with Copeland Creek. Improved habitat conditions for warm and cold water fisheries. Healthier invertebrate populations resulting from native energy inputs. Improved water quality conditions resulting from development of a thalweg,	Based on last major sediment removal project in Copeland Creek.	

Project Benefit Narrative Table						
Benefit Type	Beneficiary	When Benefits will be Received	Estimates of Without-Project Conditions	Estimates of With-Project Conditions	Description of Methods Used to Estimate	Other: Adverse Effects, Uncertainty of the Benefits, Statewide Benefits
			potential.	closed canopy, and improved riparian buffer filtering (native vegetation filtering runoff before it enters the channel)		
Habitat Restoration with Invasive Plant Removal	Rohnert Park & Sonoma County Water Agency	20011-2014	Reduced habitat enhancement and restoration for riparian and aquatic species with continued poor out migration and passage conditions for salmonids.	Closing canopy will decrease operational costs associated with vegetation management. Establishing focused sediment collection areas will decrease cost associated with sediment removal. Improve fish habitat and wildlife habitat and passage by creating and enhancing riparian habitat	Based on outcomes of similar projects in other parts of county.	

Water Quality Benefits for Impaired Water Bodies and Sensitive Habitats Worksheet					
Benefit Type	Number of downstream water bodies affected	Water body names	Beneficial uses* for the water bodies affected by the Project	The change in the beneficial-use* activity for the affected portion of the water body	The total load reduction of pollutants in the affected water body
Sediment Reduction	**One**	**Laguna de Santa Rosa**	Reducing sediment in Copeland Creek will result in less sediment in the Laguna.	Full effect not realized until construction of detention basins.	Requires further study
Habitat Restoration with Invasive Plant Removal	**One**	**Laguna de Santa Rosa**	Improve water quality and moderate temperatures to improve migratory corridor for various species.	Reduce invasive plant species including ludwigia by decreasing downstream movement of plants.	Requires further study
Flood Control and Increased Storm Water Detention	**One**	**Laguna de Santa Rosa**	Attenuated peak flows from storm water detention in Copeland Creek.	Some incremental flood control until construction of detention basins.	Requires further study

Project Title: Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins - Sonoma County Water Agency and Team Partners

Note: Because benefits assoicated with all project elements except the storm water detention basins are either unquantifiable or expected to be small, only costs and benefits associated with the stormwater detention basins have been tabulated.

Tables 10 and 14 – Annual Cost of Flood Damage Reduction Project/Water Supply Project
(All costs should be in 2009 Dollars)

	Initial Costs	Operations and Maintenance Costs							
YEAR	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	Total Project Budget (row (i), Total column)	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + (b)+…(f)	Discount Factor	Discounted Costs (g) x (h)
2009							$0	1.000	$0
2010			Sed/ channel mods	Detention Basins	Veg Replacement		$0	0.943	$0
2011		$ 2,000	$ 50,000				$52,000	0.89	$46,280
2012	$ 938,941	$ 2,000	$ 50,000				$990,941	0.84	$832,390
2013	$ 2,816,823	$ 2,000	$ 50,000				$2,868,823	0.792	$2,272,108
2014	$ 5,633,646	$ 2,000	$ 50,000				$5,685,646	0.747	$4,247,178
2015		$ 3,200	$ 50,000	$ 30,000			$83,200	0.705	$58,656
2016		$ 3,200	$ 50,000	$ 30,000			$83,200	0.665	$55,328
2017		$ 3,200	$ 50,000	$ 30,000			$83,200	0.627	$52,166
2018		$ 3,200	$ 50,000	$ 30,000			$83,200	0.592	$49,254
2019		$ 4,000	$ 50,000	$ 30,000	$ 20,000		$104,000	0.558	$58,032
2020		$ 3,200	$ 50,000	$ 30,000			$83,200	0.527	$43,846
2021		$ 3,200	$ 50,000	$ 30,000			$83,200	0.497	$41,350
2022		$ 3,200	$ 50,000	$ 30,000			$83,200	0.469	$39,021
2023		$ 3,200	$ 50,000	$ 30,000			$83,200	0.442	$36,774
2024		$ 3,200	$ 50,000	$ 30,000			$83,200	0.417	$34,694
2025		$ 3,200	$ 50,000	$ 30,000			$83,200	0.394	$32,781
2026		$ 3,200	$ 50,000	$ 30,000			$83,200	0.371	$30,867
2027		$ 3,200	$ 50,000	$ 30,000			$83,200	0.35	$29,120
2028		$ 3,200	$ 50,000	$ 30,000			$83,200	0.331	$27,539
2029		$ 4,000	$ 50,000	$ 30,000	$ 20,000		$104,000	0.312	$32,448
2030		$ 3,200	$ 50,000	$ 30,000			$83,200	0.294	$24,461
2031		$ 3,200	$ 50,000	$ 30,000			$83,200	0.278	$23,130
2032		$ 3,200	$ 50,000	$ 30,000			$83,200	0.262	$21,798
2033		$ 3,200	$ 50,000	$ 30,000			$83,200	0.247	$20,550
2034		$ 3,200	$ 50,000	$ 30,000			$83,200	0.233	$19,386
2035		$ 3,200	$ 50,000	$ 30,000			$83,200	0.22	$18,304
2036		$ 3,200	$ 50,000	$ 30,000			$83,200	0.207	$17,222
2037		$ 3,200	$ 50,000	$ 30,000			$83,200	0.196	$16,307
2038		$ 3,200	$ 50,000	$ 30,000			$83,200	0.185	$15,392
2039		$ 4,000	$ 50,000	$ 30,000	$ 20,000		$104,000	0.174	$18,096
2040		$ 3,200	$ 50,000	$ 30,000			$83,200	0.164	$13,645
2041		$ 3,200	$ 50,000	$ 30,000			$83,200	0.155	$12,896
2042		$ 3,200	$ 50,000	$ 30,000			$83,200	0.146	$12,147
2043		$ 3,200	$ 50,000	$ 30,000			$83,200	0.138	$11,482
2044		$ 3,200	$ 50,000	$ 30,000			$83,200	0.13	$10,816
2045		$ 3,200	$ 50,000	$ 30,000			$83,200	0.123	$10,234
2046		$ 3,200	$ 50,000	$ 30,000			$83,200	0.116	$9,651
2047		$ 3,200	$ 50,000	$ 30,000			$83,200	0.109	$9,069
2048		$ 3,200	$ 50,000	$ 30,000			$83,200	0.103	$8,570
2049		$ 4,000	$ 50,000	$ 30,000	$ 20,000		$104,000	0.097	$10,088

Tables 10 and 14 – Annual Cost of Flood Damage Reduction Project/Water Supply Project (All costs should be in 2009 Dollars)									
	Initial Costs	Operations and Maintenance Costs							
YEAR	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	Total Project Budget (row (i), Total column)	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + (b)+…(f)	Discount Factor	Discounted Costs (g) x (h)
2050		$ 3,200	$ 50,000	$ 30,000			$83,200	0.092	$7,654
2051		$ 3,200	$ 50,000	$ 30,000			$83,200	0.087	$7,238
2052		$ 3,200	$ 50,000	$ 30,000			$83,200	0.082	$6,822
2053		$ 3,200	$ 50,000	$ 30,000			$83,200	0.077	$6,406
2054		$ 3,200	$ 50,000	$ 30,000			$83,200	0.073	$6,074
2055		$ 3,200	$ 50,000	$ 30,000			$83,200	0.069	$5,741
2056		$ 3,200	$ 50,000	$ 30,000			$83,200	0.065	$5,408
2057		$ 3,200	$ 50,000	$ 30,000			$83,200	0.061	$5,075
2058		$ 3,200	$ 50,000	$ 30,000			$83,200	0.058	$4,826
2059		$ 4,000	$ 50,000	$ 30,000	$ 20,000		$104,000	0.054	$5,616
2060		$ 3,200	$ 50,000	$ 30,000			$83,200	0.051	$4,243
2061		$ 3,200	$ 50,000	$ 30,000			$83,200	0.048	$3,994
2062		$ 3,200	$ 50,000	$ 30,000			$83,200	0.046	$3,827
2063		$ 3,200	$ 50,000	$ 30,000			$83,200	0.043	$3,578
2064		$ 3,200	$ 50,000	$ 30,000			$83,200	0.041	$3,411
Project Life									
								Total Present Value of Discounted Costs (Sum of Column (i))	$8,402,992

Project Title: Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins - Sonoma County Water Agency and Team Partners

Table 15 – Annual Water Supply Benefits (All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
2009	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	1.000	$45,000
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	1.000	$5,625
2010	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.943	$42,435
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.943	$5,304
2011	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.89	$40,050
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.89	$5,006
2012	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.84	$37,800
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.84	$4,725
2013	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.792	$35,640
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.792	$4,455
2014	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.747	$33,615
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.747	$4,202
2015	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.705	$31,725
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.705	$3,966
2016	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.665	$29,925
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.665	$3,741
2017	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.627	$28,215
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.627	$3,527
2018	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.592	$26,640
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.592	$3,330
2019	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.558	$25,110
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.558	$3,139
2020	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.527	$23,715

Table 15 – Annual Water Supply Benefits									
(All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.527	$2,964
2021	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.497	$22,365
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.497	$2,796
2022	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.469	$21,105
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.469	$2,638
2023	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.442	$19,890
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.442	$2,486
2024	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.417	$18,765
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.417	$2,346
2025	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.394	$17,730
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.394	$2,216
2026	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.371	$16,695
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.371	$2,087
2027	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.35	$15,750
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.35	$1,969
2028	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.331	$14,895
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.331	$1,862
2029	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.312	$14,040
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.312	$1,755
2030	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.294	$13,230
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.294	$1,654
2031	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.278	$12,510
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.278	$1,564

Table 15 – Annual Water Supply Benefits (All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
2032	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.262	$11,790
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.262	$1,474
2033	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.247	$11,115
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.247	$1,389
2034	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.233	$10,485
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.233	$1,311
2035	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.22	$9,900
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.22	$1,238
2036	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.207	$9,315
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.207	$1,164
2037	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.196	$8,820
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.196	$1,103
2038	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.185	$8,325
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.185	$1,041
2039	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.174	$7,830
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.174	$979
2040	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.164	$7,380
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.164	$923
2041	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.155	$6,975
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.155	$872
2042	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.146	$6,570
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.146	$821
2043	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.138	$6,210

Table 15 – Annual Water Supply Benefits (All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.138	$776
2044	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.13	$5,850
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.13	$731
2045	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.123	$5,535
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.123	$692
2046	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.116	$5,220
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.116	$653
2047	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.109	$4,905
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.109	$613
2048	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.103	$4,635
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.103	$579
2049	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.097	$4,365
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.097	$546
2050	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.092	$4,140
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.092	$518
2051	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.087	$3,915
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.087	$489
2052	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.082	$3,690
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.082	$461
2053	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.077	$3,465
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.077	$433
2054	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.073	$3,285
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.073	$411

Table 15 – Annual Water Supply Benefits									
(All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
2055	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.069	$3,105
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.069	$388
2056	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.065	$2,925
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.065	$366
2057	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.061	$2,745
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.061	$343
2058	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.058	$2,610
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.058	$326
2059	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.054	$2,430
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.054	$304
2060	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.051	$2,295
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.051	$287
2061	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.048	$2,160
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.048	$270
2062	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.046	$2,070
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.046	$259
2063	Increased Water Supply/ Reliability	acre-feet	0		0	$ 600	$0	0.043	$0
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.043	$242
2064	Increased Water Supply/ Reliability	acre-feet	0	75	75	$ 600	$45,000	0.041	$1,845
	Increased Instream Flows for Environmental Purposes	acre-feet	0	75	75	$ 75	$5,625	0.041	$231
Project Life									
							Total Present Value of Discounted Costs (Sum of Column (i))		$858,336
Comment Box									

Project Title: Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins - Sonoma County Water Agency and Team Partners

Avoided Project: Construction of conveyance capacity upgrades (e.g. culverts, storm drains, etc.) and future sediment removal and vegetation management

Table 16 – Annual Cost of Avoided Projects
(All costs should be in 2009 Dollars)

	Initial Costs	Operations and Maintenance Costs				
YEAR	(a)	(b)	(c)	(g)	(h)	(i)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided O&M Costs	Total Costs (a) + (b)+…(f)	Discount Factor	Discounted Costs (g) x (h)
2009				$0	1.000	$0
2010				$0	0.943	$0
2011				$0	0.89	$0
2012	$ 1,000,000		$ 20,000	$1,020,000	0.84	$856,800
2013			$ 20,000	$20,000	0.792	$15,840
2014			$ 20,000	$20,000	0.747	$14,940
2015			$ 20,000	$20,000	0.705	$14,100
2016			$ 20,000	$20,000	0.665	$13,300
2017			$ 20,000	$20,000	0.627	$12,540
2018			$ 20,000	$20,000	0.592	$11,840
2019			$ 20,000	$20,000	0.558	$11,160
2020			$ 20,000	$20,000	0.527	$10,540
2021			$ 20,000	$20,000	0.497	$9,940
2022			$ 20,000	$20,000	0.469	$9,380
2023			$ 20,000	$20,000	0.442	$8,840
2024			$ 20,000	$20,000	0.417	$8,340
2025			$ 20,000	$20,000	0.394	$7,880
2026			$ 20,000	$20,000	0.371	$7,420
2027			$ 20,000	$20,000	0.35	$7,000
2028			$ 20,000	$20,000	0.331	$6,620
2029			$ 20,000	$20,000	0.312	$6,240
2030			$ 20,000	$20,000	0.294	$5,880
2031			$ 20,000	$20,000	0.278	$5,560
2032			$ 20,000	$20,000	0.262	$5,240
2033			$ 20,000	$20,000	0.247	$4,940
2034			$ 20,000	$20,000	0.233	$4,660
2035			$ 20,000	$20,000	0.22	$4,400
2036			$ 20,000	$20,000	0.207	$4,140
2037			$ 20,000	$20,000	0.196	$3,920
2038			$ 20,000	$20,000	0.185	$3,700
2039			$ 20,000	$20,000	0.174	$3,480
2040			$ 20,000	$20,000	0.164	$3,280
2041			$ 20,000	$20,000	0.155	$3,100
2042			$ 20,000	$20,000	0.146	$2,920
2043			$ 20,000	$20,000	0.138	$2,760
2044			$ 20,000	$20,000	0.13	$2,600
2045			$ 20,000	$20,000	0.123	$2,460
2046			$ 20,000	$20,000	0.116	$2,320
2047			$ 20,000	$20,000	0.109	$2,180
2048			$ 20,000	$20,000	0.103	$2,060
2049			$ 20,000	$20,000	0.097	$1,940
2050			$ 20,000	$20,000	0.092	$1,840
2051			$ 20,000	$20,000	0.087	$1,740
2052			$ 20,000	$20,000	0.082	$1,640

Table 16 – Annual Cost of Avoided Projects (All costs should be in 2009 Dollars)						
	Initial Costs	Operations and Maintenance Costs				
YEAR	(a)	(b)	(c)	(g)	(h)	(i)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided O&M Costs	Total Costs (a) + (b)+…(f)	Discount Factor	Discounted Costs (g) x (h)
2053			$ 20,000	$20,000	0.077	$1,540
2054			$ 20,000	$20,000	0.073	$1,460
2055			$ 20,000	$20,000	0.069	$1,380
2056			$ 20,000	$20,000	0.065	$1,300
2057			$ 20,000	$20,000	0.061	$1,220
2058			$ 20,000	$20,000	0.058	$1,160
2059			$ 20,000	$20,000	0.054	$1,080
2060			$ 20,000	$20,000	0.051	$1,020
2061			$ 20,000	$20,000	0.048	$960
2062			$ 20,000	$20,000	0.046	$920
2063			$ 20,000	$20,000	0.043	$860
2064			$ 20,000	$20,000	0.041	$820
Project Life				$0		$0
Total Present Value of Discounted Costs (Sum of Column (i))						$1,123,200
Comment Box						

Table 17 – Annual Other Water Supply Benefits

Reduced electricity costs associated with pumping not quantifiable at this time.

Project Title: Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins - Sonoma County Water Agency and Team Partners

Table 18 – Total Water Supply Benefits			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$ 858,336	$ 1,123,200	$ -	$ 1,981,536